

Claims:

1. An implantable electronic device comprising:
 - a metal housing defining a leak-proof-sealed housing chamber;
 - an optically-transmissive optical element connected to the housing and defining
 - 5 a leak-proof-sealed transducer chamber external to the housing and hermetically isolated from the housing chamber;
 - electronic circuitry contained within the housing chamber; and
 - an optical transducer within the transducer chamber and connected to the circuitry.
- 10 2. The device of claim 1 wherein the housing defines an aperture, and including a closure element hermetically sealing the aperture, the optical element connected to the closure element such that the optical element and closure element together define the transducer chamber.
3. The device of claim 2 wherein the closure element includes a metal shield portion
- 15 at least partially blocking electronic interference from passing through the aperture.
4. The device of claim 2 wherein the optical element is joined to the closure element with a leak-proof seal.
5. The device of claim 2 wherein the optical element is hermetically sealed to the closure element.
- 20 6. The device of claim 1 wherein the optical transducer is a light emitting diode.
7. The device of claim 1 wherein the optical transducer is a photo-detector.
8. The device of claim 1 wherein the optical transducer includes an optical emitter and an optical detector.
9. The device of claim 1 wherein the optical element is transparent.

10. The device of claim 1 wherein the optical element is at least in part formed of a material selected from a group comprising glass, quartz, epoxy, silicone, and optical quality thermoplastic elastomers.
11. The device of claim 1 wherein the electronic circuitry includes cardiac rhythm
5 sensing circuitry operable to receive a signal from the optical transducer.
12. The device of claim 1 wherein the optical element is encapsulated in a header element connected to the housing and defining lead apertures having contacts connected to the circuitry.
13. An implantable electronic device comprising:
10 a device housing defining a leak-proof-sealed housing chamber;
electronic cardiac rhythm-sensing circuitry within the housing chamber;
an optical emitter and an optical detector connected to the circuitry and positioned outside of the housing;
an optically-transmissive optical element enclosing the emitter and detector with
15 a leak-proof seal.
14. The device of claim 13 wherein the optical element defines a chamber containing the emitter and detector.
15. The device of claim 13 wherein the housing is metal.
16. The device of claim 13 wherein the housing is hermetically sealed.
- 20 17. The device of claim 13 wherein the housing is opaque with respect to the wavelength of emissions generated by the emitter.
18. The device of claim 13 wherein the housing defines an aperture, and including a closure element hermetically sealing the aperture, the optical element connected to the closure element such that the optical element and closure element together define an
25 optical element chamber.

19. The device of claim 13 wherein the optical element is at least in part formed of a material selected from a group comprising glass, quartz, epoxy, silicone, sapphire, plastic, polymer and optical quality thermoplastic elastomers.
20. A method of manufacturing an implantable electronic device comprising:
- 5 providing a metal housing defining an aperture;
- providing a metal flange element sized to be closely received in the aperture and defining an opening;
- providing a non-metallic closure element having a periphery sized to be received in the opening, and including an optical transducer having conductive leads passing
- 10 through the closure element;
- inserting the closure element into the opening and connecting it to the flange element to provide a leak-proof seal;
- connecting an optically-transmissive element defining a chamber to the flange element, with the optical transducer received within the chamber;
- 15 positioning the flange in the aperture; and
- connecting the flange to the housing to provide a leak-proof seal.